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Centers Propose Education on Conservation Buffers: The Rural/Urban Interface

Conservation buffers of woody perennials and other plantings, such as windbreaks and riparian filter strips, have long been recognized as important for livestock, for crop production, and for attenuating the impacts of weather. Tree windbreaks are an important component of the Integrated Farm at the University of Nebraska-Lincoln Agricultural Research and Development Center. Several public agencies have long promoted these plantings for conservation purposes, and substantial funding is available from federal and local sources, such as the Nebraska Resource Districts. Yet conservation buffers continue to be an underexploited resource for Nebraska farmers.

A proposal submitted in March to USDA by CSAS brings together specialists from UNL, the National Agroforestry Center (Forest Service and Natural Resources Conservation Service) in Lincoln and the North Central Regional Center for Rural Development at Iowa State University to focus on the economic and social constraints to adoption of conservation buffers. This proposal has letters of support from 10 organizations including the Nebraska Sustainable Agriculture Society, the Conservation Tillage Information Center, and North Central Region SARE. The $1.9 million proposal (pending as of this writing) uses a multi-partnered, integrated approach that includes research to determine the factors that impede adoption of conservation buffers as well as an education campaign using farmer and landowner workshops, direct mailings, interactive television programs, and other methods of reaching private landowners with information about the benefits of conservation buffers.

Challenges at the Rural/Urban Interface

A valuable extension of the application of conservation buffers in agriculture is their use at the boundary between agriculture and city dwellers -- the rural/urban interface. People in urban areas are among the most important clients for products from agriculture, yet there is a growing distance between urban and agricultural sectors. The increasing concentration of U.S. farming on basic crop commodities and the dominance of processing and advertising from vertically integrated major food companies has accentuated this distance from field to household. A Nebraska farmer should not be surprised to learn that people living across the fence have little idea how these fields of basic grains eventually make their way to the table. Repeated applications of chemical fertilizers and pesticides, use of large field equipment producing noise and dust, and limited or no jobs in agriculture make farms a perceived liability to their urban neighbors rather than a source of pride and a viable part of the local economy. On the flip side, the environmental impact that urbanization has on its agricultural neighbors and the threats and pressures of urban-driven agricultural policies and regulations create a *zone of tension* where these two land uses meet.

Woody conservation buffers are seen as one way to *buffer* or separate the activities of the farm and town. Such a band-aid approach of using narrow bands of plantings of windbreaks or riparian buffer strips can potentially screen off the farms and some of the dust, noise, and chemical drift. These buffers can also prevent some encroachment by snowmobiles, dogs, and garbage that moves from homes onto farmland. This function is analogous to the tall barriers built along some interstate highways that course through large cities. However, this use of buffers as screens or barriers does little to solve the greater challenge at hand and may reinforce an Aus versus them@ mentality. This approach certainly does not bring urban people closer to agriculture, nor does it capitalize on the fuller suite of benefits of buffers (e.g., recreational opportunities such as birdwatching, hiking and biking; wildlife habitat; aesthetics; landscape diversity) that can be shared by farm and town folk alike.

From Tension Zone to Common Ground

Rather than promoting buffers as a means to *separate* the town and the farm at this interface, we should reconceptualize this boundary as an area to create and enhance the interaction between farms and communities. The AWorking Trees@ concept coined by the National Agroforestry Center could be extended to a buffer system that works for people on both sides of the interface area. These multi-use buffer zones can be areas of recreational and aesthetic enjoyment that are otherwise unavailable in the immediate vicinity. They can serve as zones for education about agriculture, food, and protection of natural resources. Buffers could potentially provide economic opportunities for people on both sides either through designs that enhance specialty crop production, incorporation of plant materials for craft and floral activities, or promotion of recreational activities. Further, they could serve as a clear delineation of activities -- a boundary beyond which urban expansion should not go, and where natural resources valued by both parties are protected and showcased.

Whether a buffer system is legally in public or private hands, it should be one that is designed to incorporate a shared vision of the two groups, thereby effectively changing it from a *tension zone* to one of *common ground*. The mere exercise of joint planning for this small but critical piece of land would provide a focused forum in which to initiate communication between these two groups. The mentality of a *shared ownership/shared responsibility* should foster care and concern for the area which ultimately determines the sustainability of this area. Such win-win solutions as AWorking Trees for the Rural/Urban Interface@ are appropriate for a coming century when land will be more scarce, and we face increasing pressures to find ways to more wisely use these resources to benefit the people and the environment.

Submitted by Charles Francis and Michele Schoenberger

Highlights of Upcoming Book: Under The Blade

This article is the second in a series that highlights information in a book to be published this December by Westview Press titled *Under the Blade: The Conversion of Agricultural Landscapes*. Richard Olson focuses on a landscape perspective on farmland conversion. Olson co-edited the book with Tom Lyson. Authors who contributed chapters are from universities around the country. For more information, contact Olson at the CSAS office, or e-mail him at csas005@unlvm.unl.edu.

Under the dome

When we think of the loss of farmland, we often think only of a reduction in our ability to produce food and fiber. But rural landscapes have many other functions. The excellent book *Our Ecological Footprint* (1996) illustrates this point with a clever thought exercise. Imagine enclosing a city such as New York under a huge plastic dome that allows light to pass but nothing else. The city is cut off from the surrounding countryside. Now imagine the effect of this enclosure on the environment of the city. The air grows stale and polluted, sewage accumulates, and supplies of clean water, raw materials, and food are depleted. Of less immediate concern to the trapped residents, their world no longer includes most other species, opportunities for recreation and aesthetic enjoyment of rural areas, or an environment conducive to rural cultures (can you imagine the Amish maintaining their culture within the dome?). Rural landscapes provide many functions other than food production.

The next step in this exercise is to expand the dome=s edge beyond the city limits. How large an area of the surrounding landscape needs to be enclosed to allow the domed city to be sustainable? The answer depends on the population of the city, consumption patterns, and the characteristics of the surrounding landscape (see next article). For its water alone, New York City depends on watersheds totaling 1900 square miles.

Structure and function

Development alters both the structure and function of landscapes. For example, paving 10-20% of a watershed can double the amount of runoff. Downstream parcels are affected; the impact of development is not restricted to the developed parcel. This interaction among parcels determines landscape function, and is the reason that the effects of development are often greater than the amount of built land would suggest.

Andrews and Chetrick (1988) examined the relationship between population density and agricultural production for 51 counties near the New York and Philadelphia metropolitan areas. Their analysis controlled for differences in productivity due to different levels of inputs (land, capital, fertilizer, labor, livestock). Their study showed that a 1% increase in population in a suburban county reduced the agricultural output of the average farm in that county by 0.1-0.2%, *independent of any change in the levels of inputs used*. Development not only eliminates agriculture from the developed parcels, it reduces the productivity of the remaining farms.

As traffic increases, farmers have difficulty moving equipment between fields. Field operations such as spraying may have to be modified or curtailed to avoid complaints from neighbors, and complaints may escalate to costly law suits or regulatory restrictions on farming activities. Dogs may harass livestock, and theft and vandalism increase. Ultimately, as the number of farms decreases, the infrastructure needed to support the remaining farms declines. Local equipment, seed, and fertilizer dealers go out of business, forcing the farmer to travel further to obtain supplies. Escalating land prices prevent new farmers from gaining a foothold, and an impermanence syndrome takes hold in which farmers believe development is inevitable. Much of the farmland surrounding any American city is owned by speculators and rented to pay the taxes until development occurs.

Preserving landscape function

There are ways to reduce the deleterious effects of development on landscape functions. Houses can be clustered on the less productive or less environmentally sensitive land, and permanent conservation easements attached to the remaining land. Streets can be made narrower to reduce impervious surfaces. Greenbelts can separate and buffer agriculture from urban areas. Corridors can be retained between natural areas to allow movement of wildlife.

Because landscape functions are the result of the interactions among all parcels, preserving landscape functions requires some constraints on private property rights. The allowable uses of a piece of land need to be considered in the context of the whole landscape and society=s objectives for landscape functions. This approach results in some very contentious philosophical and legal conflicts. Some of the legal aspects of land use and farmland preservation will be discussed in the next article in this series.

References:

Andrews, M.S. and J. Chetrick. 1988. Agricultural productivity in densely populated areas. Landscape and Urban Planning 16:311-318.

Wackernagel, M. and W. Rees. 1996. Our Ecological Footprint. New Society Publishers, Philadelphia.

Using Ecological Footprints to Define Sustainability

Ecological Footprint Analysis is an accounting procedure pioneered by Mathis Wackernagel and William Rees at the University of British Columbia for estimating the area of productive land necessary to sustain current levels of resource consumption and waste discharge by a particular human population (see previous article). An analysis uses information on land use, land productivity, population, consumption, and trade to estimate ecological footprints. It can be applied to a person, household, city, country, or the whole world, and can be conducted at different levels or detail depending on available information, time, and the goals of the user. It is especially useful as an educational tool for illustrating our dependence on ecosystems, and a policy tool for identifying imbalances between a population and its resource base.

In an ecological footprint analysis done by CSAS, resource consumption in the United States during 1994 was found to exceed its productive land base by a factor of four (10.4 ha estimated footprint per capita vs. 2.7 ha productive land per capita). By exceeding its productive land area, the U.S. is effectively drawing on land outside its boundaries or temporarily consuming natural capital. The results of the analysis are even more grim when considering trends of increasing population growth and per capita consumption since 1994, thereby resulting in even greater disparity between the current footprint and the area of productive land.

Reducing the U.S. footprint is a major challenge. Any transition to a more sustainable society requires identification of strategies that will allow individual consumers to reduce their impact on the natural resource base. Assuming that a country=s footprint is the aggregate of its household footprints, directing strategies within the context of a household is appropriate.

Strategies to reduce the U.S. ecological footprint include the following:

- Diets would be vegetarian or nearly so, with a significant proportion of consumed food being grown on-site.
- Household energy needs would be met the majority of the year by a renewable energy source.
- Household energy-use efficiency would be greatly improved through the installation of low-watt appliances (e.g., compact fluorescent bulbs).
- Areas surrounding houses would be planted to functional vegetation (e.g., trees for shade, vegetables for food).
- Second-hand stores and garage sales would be the first places to shop for apparel and personal care products.
- Trains, buses and bicycles would be the primary means of transportation.

- Greater responsibility for personal health would be taken by family members through the adoption of strategies that prevent sickness.
- Family entertainment would be exclusively home-centered.

Details of any transition to create a smaller household footprint will vary depending on climatic and social factors. However, increased use of renewable energy sources seems to be a basic requirement. As a result, technology plays a central role in reducing ecological footprints. However, many strategies do not rely on technology, but on simple changes in behavior instead. Changing our diets, choosing not to drive, and taking more responsibility for our own health significantly reduces our personal footprints, and often requires less technology, not more.

Perhaps most significant in efforts to make household footprints smaller is that many changes in consumption patterns are synergistic. Changing our diets to reduce consumption of energy-intensive foods will likely improve personal health. Opting to ride bicycles in place of driving will improve aerobic fitness as well as reduce carbon dioxide emissions. Adapting homes so that food can be grown on-site will reduce reliance on non-renewable resources. Opportunities for synergy are many, and indicate that doing one thing to reduce our household=s (and country=s) ecological footprint will often yield multiple positive effects for ourselves and the environment.

Submitted by Mark Liebig and Richard Olson

Editor=s Note: Two CSAS posters on the ecological footprint concept were presented by Mark Liebig at the Soil and Water Conservation Society annual conference in San Diego, CA, July 1998. The posters were part of a special session on environmental effects of land use changes.

CSAS Fall Seminar Series

Small Farming Systems for the Midwest: Waking Up to Promising Possibilities is the theme for the following seminars, to be held at 3:00 on Tuesdays in the UNL East Campus Union.

15 Sep	Chuck Hassebrook - Walthill, NE	A time to act for family-sized farms
22 Sep	Lynn Byczynski - Lawrence, KS	Successful systems for market

		gardening
29 Sep	Tom Frantzen - New Hampton, IA	Hogs, hoop houses, and holistic management: A diversified crop/livestock farm
6 Oct	Tom Wahl and Kathy Dice - Wapello, IA	Trees and herbs: A multi-storied agricultural system for southeastern Iowa
13 Oct	Deborah Stinner - Wooster, OH	Innovation guided by culture: Amish farms in Ohio
20 Oct	Muriel Barrett - Sutherland, NE	Adding value: Pastured-poultry, direct marketing, agritourism and other strategies
27 Oct	Tom Larson - St. Edward, NE	Integrating management intensive grazing with crop production
3 Nov	Dave Welsch - Milford, NE	A diversified organic croplivestock system
10 Nov	Larry Mawby - Suttons Bay, MI	Making a small farm work: Lessons from a vineyard and winery
17 Nov	Michael Duffy - Ames, IA	The economics of small farms

NOVA University: Regional Education Focus

The Nordic Forestry, Veterinary and Agricultural University (NOVA) is a new regional concept that could serve as a model for the Midwest. Envisioned as a university without walls, NOVA was established in 1995 and is governed by the rectors or deans of the faculties of seven universities in Denmark, Sweden, Finland, Norway, and Iceland. The current rector of NOVA University is Mårten Carlsson, located at SLU in Alnarp, Sweden. NOVA=s overall goal is to raise the quality of regional education and research.

Visions of NOVA members include pooling human resources and facilities to achieve mutual goals in ways that would not be possible as individual universities, a challenge similar to that faced in the North Central Region of the U.S. More detailed visions for NOVA include increased mobility of students and faculty among Nordic agricultural universities, joint postgraduate courses, coordinated research programs, and division of responsibility on topics no single country could maintain or finance alone. A new dimension is advancing international cooperation with the Baltic countries (Estonia, Latvia and Lithuania), with European Union countries, and with the developing world.

The NOVA postgraduate school builds on a long tradition of Nordic research courses. In plant breeding, these courses have been held each year since 1975; the first course in a Baltic country (Estonia in 1997) focused on breeding crops for sustainable systems. Each year 10 to 12 courses are held on specific topics including three PhD short courses from 1995 to 1997 on ecological agriculture. To facilitate student mobility, resident courses from all NOVA universities are now open to all postgraduate students within the region. There are plans for a newly proposed MSc in Arctic Agriculture and Rural Development for the region. Charles Francis (CSAS director on professional development leave) is the first visiting NOVA professor; he is spending one year in the region working with colleagues to plan a curriculum and teach courses on ecological agriculture.

Mobility for undergraduate students has been hampered by rigid prerequisites and course requirements in each country. Credit and tuition problems have been resolved, and programs are being planned to include short courses and summer courses, one-semester course packages, courses toward the master=s degree, and developing a full study program that will involve multiple universities. NOVA is cooperating closely with two European educational initiatives: AErasmus@ and the follow-up ASocrates@ program. Current projects for undergraduates are in horticulture, agricultural engineering, and veterinary medicine. There are still many problems to solve, but good progress has been made in some areas.

A new NOVA program has been established with the Baltic agricultural universities. The goal is to integrate educational programs and promote close collaboration among universities that share the same ecoregion and common future. There is a focus on sustainable use of natural resources, food production, rural development, and environmental protection. Sharing library services and intensive short courses are two of the initial cooperative activities.

Agroecozones know no political boundaries. In times of scare finances for research and education, it makes perfect sense to pool resources to help meet common goals. The North Central Institute for Sustainable Systems has been working toward similar goals for our Midwest region since 1996. We need to recognize the interdependence of both farmers and researchers in similar ecozones, and build efficient organizations that will engender public support and promote practical education for the future. NOVA University provides us with one such model.

*Submitted by Mårten Carlsson (NOVA University),
Geir Lieblein (Agricultural University of Norway) and Charles Francis*

Integrated Farm Update:

Accumulation of Residual Nitrate Beneath Corral Areas

Two cattle corrals that have been used continually during 1992-1997 were sampled to determine residual nitrate levels below the surface. One area has been used by calves (500 lbs) during grazing of irrigated corn stalks or soybean stubble for a two-month period each winter. The other area was used as a watering area for cows during winter grazing of corn stalks.

In the area the calves used, soil samples were taken (to a depth of 5') in the spring of 1997 following winter grazing of corn stalks and soybean stubble. Samples were also taken in each corn and soybean field as a check. An average of 74 calves each winter have grazed on this field and used the corral area. Samples taken on the corn stalk corral area indicated a soil nitrate level of 408 lbs/acre compared to 155 lbs/acre for the control taken in the stalk field. Nitrate level below the corral area in the soybean stubble was 334 lbs/acre compared to 160 lbs/acre in the control soybean stubble field. In the spring of 1997 corn was planted in the soybean corral area, following application of 200 lbs/acre of nitrogen (N), and soybeans were planted in the non-fertilized corn corral area. Soybeans have been shown to be good scavengers of N from the soil. Following harvest in November 1997, samples were taken in the same areas as in the spring. Results show soil nitrate levels of 188 lbs/acre following soybeans in the corral area and 69 lbs/acre in the control. Thus soybeans were successful in reducing nitrate levels in the soil. In the corn corral area, soil nitrate levels were 195 lbs/acre, compared to 176 lbs/acre in the control. Soil nitrate levels were reduced 140 lbs (42%) in the corral area even after application of 200 lbs N fertilizer. Nitrate levels for the control area in the corn stalks in the fall were similar to the spring.

In the area used by the cows, soil samples were taken in November 1997 in the watering area following corn grain harvest. An average of 100 cows each winter used this watering area for a two-month period. Check plots on each side of the watering area were sampled to determine nitrate levels. Results indicate an average nitrate buildup of 104 lbs/acre in the watering area. There were 175 lbs/acre nitrate in samples 25' out from the watering tank, 33 lbs/acre 75' out, and 61 lbs/acre 100' out. Average nitrate levels were increased 43 lbs (70%) in the watering area compared to the control, and 114 lbs (187%) in the samples 25' out.

These results indicate that nitrate can build up in a corral area in a stalk field if the same area is used continuously for several years. If large numbers of cattle use a substantial area of a field, it may be advisable to sample this area separately to determine soil nitrate levels and thus the crop needs. Grid sampling and the use of variable rate fertilizer application may be advisable, especially to reduce N application rates in the corral areas.

Submitted by Gary Lesoing

NCR SARE Releases Priority Areas

Priority areas for the 1999 North Central Region Sustainable Agriculture Research and Education preproposals are on the Web at http://www.sare.org/san/ncrsare/news/priority99.html or contact the NCR SARE office, 402-472-7081, sare001@unlvm.unl.edu. Preproposals are due on September 11, 1998.

Coming Events

Contact CSAS office for more information.

1998

Sep. 9-10 B Thompson On-Farm Research Field Day, Boone, IA

Sep. 10-11 B The Performance of State Programs for Farmland Retention: A National Research Conference, Columbus, OH

Sep. 14-17 B Nebraska Rural Institute, Ogallala, NE

Oct. 4-7 B North American Conference On Enterprise Development Through Agroforestry, Minneapolis, MN

Nov. 4-5 B National Ground Water Association Animal Feeding Operations and Ground Water: Issues and Impacts Conference, St. Louis, MO; http://www.ngwa.org/whatsnew/afo.html

Nov. 8-11 C New Crops & New Uses: Biodiversity & Agricultural Sustainability, Phoenix, AZ; http://www.hort.purdue.edu/newcrop/announce/symposium.html

Nov. 16-21 C 12th International Federation of Organic Agriculture Movements (IFOAM) Scientific Conference and General Assembly, Buenos Aires, Argentina; http://ecoweb.dk/ifoam/conf/conf98/

Nov. 23-27 B First International Agronomy Congress - Agronomy, Environment, and Food Security for 21st Century, New Delhi, India

Nov. 29 - Dec. 4 B AFSRE 15th Symposium - Rural Livelihoods, Empowerment and the Environment: Going Beyond the Farm Boundary, Pretoria, South Africa

Dec. 10 B Conference - Farming Profitably in a Changing Environment, Urbana, IL

1999

Jan. 8-9 B Great Plains Regional Vegetable Conference, St. Jo, MO

Jan. 21-22 B Farm Marketing into the Next Millenium - joint conference of the North American Farmers= Direct Marketing Association and the Great Lakes Vegetable Growers Convention, Grand Rapids, MI

June 12-16 B 6th Conference on Agroforestry in North America: Sustainable Land-Use Management for the 21st Century, Hot Springs, AR (call for papers deadline Oct. 1, 1998) tclason@agctr.lsu.edu; http://www.missouri.edu/~afta/Sixth_Conf.html

June 14-16 B XXVIII International Congress Work Sciences in Sustainable Agriculture, Horsens, Denmark; http://www.sp.dk/~cgs/ciosta/

Did You Know

In June Prince Charles, who owns an organic farm, called for a public debate on the merits of allowing genetically engineered food to be grown in Britain.

The Center for Sustainable Agricultural Systems bimonthly newsletter is currently available free in hard copy to U.S. addresses.
Current and back issues, along with other sustainable agriculture information is also available on our Web page:
http://www.ianr.unl.edu/ianr/csas/
For comments or questions, or to be added to the mailing list for hard copy,

contact the editor at the masthead address, or e-mail csas001@unlvm.unl.edu.

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